INNOVATION, RESEARCH AND DEVELOPMENT IN ROMANIAN ENTREPRISES

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Abstract

The European Union declared the year 2009 – The Year of Creativity and Innovation. Creativity and innovation can move society forward toward prosperity. In this context, we analyzed in our paper the innovation, research & development potential and performance of the Romanian enterprises. After presenting the conceptual framework and statistical sources in EU for innovation and a general overview of Europe seen as a place for research activities, we examined in details the Romania case: a country still in the group of catching-up countries, but one of the growth leaders among this group. In the last part of the paper we focused on research and development data analysis for the 2003-2008 interval, at enterprise level, also with commentaries about the economic and financial crisis impact.

Key-words: *innovation, research, development, creativity, Romanian enterprises*

JEL Classification: O_{30}, O_{31}

Introduction

Innovation has to be considered a core element of the renewed Lisbon strategy for growth and employment. Sustainable growth and job creation in the European Union increasingly depends on excellence and innovation as the main drivers of European competitiveness. In order to compete in the global economy marked by the economic and financial crisis, enterprises must become more inventive, react better to the consumers' needs and preferences and address challenges by increased innovation. Recognizing this fact, the European Union declared the year 2009 – The Year of Creativity and Innovation. Creativity and innovation can move society forward toward prosperity.

Literature review

In the context of 2009 – The Year of Creativity and Innovation, it is hardly surprising that the innovation, research and development issues have attracted

considerable attention in recent years. Generally, studies and articles have focused on the situation in the 27 Member States (European Union, Manifesto – *European Ambassadors for Creativity and Innovation*, Creativity and Innovation Year 2009, *European Innovation Scoreboard 2008: Summary of the situation in the 27 Member States*. MEMO/09/18, Brussels, 22 January 2009, *Science, technology and innovation in Europe*, European Commission, Eurostat Pocketbooks, 2008 edition and the like), but also on new European initiatives in favour of the support of innovation (European Commission, Enterprise and Industry 2010 – *Europe INNOVA*, European Commission, Enterprise and Industry 2010 – *A Lead Market Initiative for Europe*, European Commission, Enterprise and Industry 2010 – *PRO INNO Europe*, European Commission 2010 – *Enterprise Europe Network* and the like). The reports regarding especially Romania or some Romanian studies (European Commission, Enterprise Directorate General, *INNO – Policy TrendChart, Innovation Policy Progress Report, Romania 2009*, RO INNO Romania 2010 – *Business Incubators*, RO INNO Romania 2010 – *Innobarometer 2008*), and Romanian statistical data from National Institute of Statistics, like *Research-development in Romania – Statistical data collection (2003-2008)* are also useful for our research.

Theoretical background

For this analysis we used data from international sources (European Innovation Scoreboard 2008, Global Competitiveness Report 2009 – World Economic Forum, INNO-Policy Trendchart, Innovation Policy Progress Report, Romania 2009 and the like) and also from national sources (Innobarometer 2008 Report published by the Romanian National Authority of Scientific Research, data regarding enterprises from the Romanian National Institute of Statistics and the like).

Using SPSS (Statistical Package for the Social Sciences) and Le Sphinx softwares, we developed a regression analysis in order to determine whether the turnover of enterprises (dependent variable) is related to gross investments and research and development expenses (independent variables). This way we demonstrated the importance of innovation (in terms of research and development) for enterprise competitiveness.

1. *Innovation – the main driver of European competitiveness*

Having a detailed look at the most important aspects of the European Union research and innovation investment and performance presented in *Key Figures 2005* report, which offers an overview of the progress achieved towards the 3% objective. The need for Europe to strengthen its research and innovation capacities is obvious. The Key Figures 2005 shows the worrying trend of R&D investment in Europe: the growth rate of R&D intensity has been declining since 2000 and is close to zero, growth of R&D investment as a % of GDP has been slowing down, from 2002 to 2003, only an increase of 0.2% being achieved. Europe devotes a

much lower share of its wealth to R&D, compared to the US, China and Japan: 1.93% of GDP in the EU in 2003, as compared to 2.59% in the US and 3.15% in Japan. As for China, which registers a lower R&D intensity than Europe (1.31%), but with a 10% increase between 1997 and 2002, it will reach by 2010 the same R&D intensity as Europe (about 2.2%). One of the reasons of this worrying trend is business funding of R&D, and one of the most worrying conclusions of the Key Figures 2005 is that Europe is becoming a less attractive place for research activities.

In this context, European Union developed new initiatives in favour of the support of innovation like Lead Market Initiative for Europe, Europe Innova, Pro Inno Europe or Enterprise Europe Network, which is part of Competitiveness and Innovation Framework Programme. For examples, *Lead Market Initiative for Europe* is aiming to unlock market potential for innovative goods and services by lifting obstacles hindering innovation in a first batch of six important markets: eHealth, protective textiles, sustainable construction, recycling, bio-based products and renewable energies. These markets are highly innovative, respond to customers' needs, have a strong technological and industrial base in Europe and depend more than other markets on the creation of favourable framework conditions through public policy actions. *Pro Inno Europe* is aiming to become the focal point for innovation policy analysis, learning and development in Europe, with the view to learning from the best and contributing to the development of new and better innovation. Pro Inno Europe supports *The Network of Innovating Regions in Europe* which provides a platform for the development of 'Regional Innovation Strategies', the exchange of best practices for regional support to innovation and it develops methodologies to benchmark regional strategies. From projects funded by *Europe Innova* we can mention as remarkable examples The European Eco-innovation Platform with the aim to accelerate the take-up of eco-innovative solutions in Europe or Knowledge Intensive Services Innovation Platform with the aim to accelerate the take-up of services innovations in Europe, but there are more else.

2. *Innovation: conceptual framework and statistical sources in the European Union*

In Oslo Manual 2007 innovation is considered 'a new or significantly improved product (good or service) introduced to the market or a new or significantly improved process introduced within an enterprise. Innovations are based on the results of new technological developments, new combinations of existing technology or utilization of other knowledge acquired by the enterprise'. Also, it is important to remember an approach from 1995: according to *Green Paper on Innovation, European Commission*, innovation is: 'the renewal and enlargement of the range of products and services and the associated markets; the establishment of new methods of production, supply and distribution; the introduction of changes in management, work organization, and the working conditions and skills of the workforce.'

Generally, in the EU statistical reports, the following terms regarding innovation are used:

- *Product innovation* which refers to introduction to the market of a new good or service or of a good or service with significantly improved capabilities, such as improved software, user-friendly components or sub-systems.
- *Process innovation* which represents the implementation of a new or significantly improved production process, distribution method or support activity for goods or services. Purely organizational innovations are excluded in this form of innovation.
- *Organizational innovation* which is implementation of new or significant changes in a firm's structure or management methods that are indented to improve the firm's use of knowledge, the quality of its goods and services or the efficiency of its workflows.
- *Marketing innovation* understood as implementation of new or significantly improved designs or sales methods to increase the appeal of goods and services or to enter new markets.
- *Intramural (in-house) R&D* which refers to creative work undertaken within the enterprise to increase the stock of knowledge and use it to devise new and improved products and processes (including software development).
- *Extramural R&D* which comprises the same activities as intramural R&D, but performed by other companies (including other enterprises within the same group) or by public or private research organizations and purchased by the enterprise.

The innovation challenge for the success of European economy is argued by the recent efforts of quantifying innovation, assessing innovation performance, policy responses, innovation policy governance and trends across EU, and also measuring the progress of knowledge-based economy. In this sense it is worth to remember as main statistical sources for innovation: STI (Science, Technology and Innovation) – EUROSTAT, EIS (European Innovation Scoreboard) – PROINNO Europe, SIW (Sectoral Innovation Watch) – Europe INNOVA, Innobarometer, INNO-Policy TrendChart, Sectoral Innovation Watch, European Cluster Observatory. A new remarkable initiative is the use of composite indicators to assess progress towards the knowledge-based economy, still an emerging and pioneering field in European statistics. Two composite indicators have thus been developed: one is aggregating the various forms of investment in the knowledge-based economy and the other is aggregating measures of performance in the knowledge-based economy. These composite indicators are a weighted average of a number of components or base indicators and have been developed with the involvement of a number of Commission services, including Eurostat and the Applied Statistics Group of the Joint Research Centre, and external assistance from academic world.

3. *Romania in the European Union – a catching-up country*

Considering the innovation performance of the different Member States, as measured in the European Innovation Scoreboard (EIS) 2008, *Romania is in the group of catching-up countries* together with Malta, Greece, Hungary, Slovakia, Poland, Lithuania, Latvia, Bulgaria and Turkey. Although these countries scores are significantly below the EU average, the scores are increasing towards the EU average over time with the exception of Greece and Lithuania. Besides this group, three other main groups of countries emerged based on performance over a five year period: Switzerland, Sweden, Finland, Germany, Denmark and the UK are the *innovation leaders*, with scores well above that of the EU27 and all other countries; Austria, Luxembourg, Ireland, France, Belgium and the Netherlands are the *innovation followers*, with scores below those of the innovation leaders but equal to or above that of the EU27; Cyprus, Estonia, Slovenia, Iceland, Czech Republic, Norway, Spain, Portugal and Italy are the *moderate innovators* with scores below that of the EU27, except for Cyprus. Recent improvements in innovation performance for Cyprus, Estonia, Slovenia and Iceland suggest that these countries could move to the innovation followers in the near future.

Having a special look to Romania, according to European Innovation Scoreboard 2008, our country is one of the growth leaders among the catching-up countries, with an innovation performance well below the EU27 average but *a rate of improvement that is one of the highest of all countries*. Considering the dimensions of innovation grouped by EIS in three main blocks (enablers, firm activities and outputs – see Fig.1), the *relative strengths*, compared to the country's average performance, are in *innovators* (the number of firms that have introduced innovations onto the market or within their organizations, covering technological and non-technological innovations) and *economic effects* (captures the economic success of innovation in employment, exports and sales due to innovation activities) and relative weaknesses are in finance and support (the availability of finance for innovation projects and the support of governments for innovation activities) and throughputs (captures the intellectual property rights generated as a throughput in the innovation process and technology balance of payments flows).

1. *Enablers*	2. *Firm activities*	3. *Outputs*
Human Resources Finance and Support	Firm Investments Linkages & Entrepreneurship Throughputs	Innovators Economic Effects

Source: based on European Innovation Scoreboard, 2008.

Fig. 1. *Dimensions of innovation – main blocks*

Over the past 5 years, Finance and Support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Public R&D expenditures (18.0%), Private credit

(17.4%), Broadband access by firms (24.3%), Community trademarks (36.0%) and Community designs (44.3%). Performance in Firm Investments and Innovators has increased at a slower pace.

As we have already pointed, considering the high growth rate of Summary Innovation Index in 2008 related 2007 and also the rankings in 2008-2009 from World Economic Forum (see fig. 2), Romania is undoubtedly one of the growth leaders among the catching-up countries.

1. ***Summary Innovation Index (SII)***: 0.277 (with a growth rate of 6.9% relative to 2007), ranked Romania 25th from 27 EU member states in 2008
(from European Innovation Scoreboard 2008)

2. ***Growth Competitiveness Index (GCI)***: ranked Romania 68th in 2008-2009, six places higher than 2007-2008
(from World Economic Forum – Global Competitiveness Report 2009)

3. ***Networked Readiness Index (NRI)***: ranked Romania 58th of 134 countries in 2008-2009, rising from 61st position in 2007 – 2008
(from World Economic Forum. Note: NRI measures countries' propensity to exploit the opportunities offered by information and communication technology)

Fig. 2. *Summarizing recent trends in Romania's innovation performance*

As stated in the Trend Chart Country Report, Romania, 2008, for our country the main challenge is the institutional one: improving innovation and business support infrastructure. This challenge is related to the need to improve the R&D absorption capacity of industry and enhance technology transfer. Business incubators are primarily managed by National Agency for SMEs and Cooperatives/Ministry of SMEs, Commerce and Business Environment and funded by the United Nations Development Programme, while innovation and technology providers are managed by the National Authority for Scientific Research and are grouped in the specialized network National Technology Transfer and Innovation Network (ReNITT from RO INNO Romania) funded both by national funds and EU Structural Funds. The performance of the existing business incubators is generally perceived to be weak and many of the incubated firms do not achieve the expected growth or new jobs, even go bankrupt shortly after or in the incubation period. ReNITT covers 13 business incubators, most part (8) in Bucharest and the others in Covasna, Brasov, Valcea, Dolj and Arad. Responsibility for the funding received from the UNDP (for business operations) or from EU Structural Fund (for the construction of the incubator) is also generally low, and the selection of firms to be incubated is often questionable. In comparison with business incubators, TrendChart Country Report, Romania 2008 appreciates that S&T Parks focus more on strengthening technology transfer and partnership among research institutes, economic agents and universities. Romania currently has four S&T Parks located

in Bucharest, Timisoara, Iasi and Galati. The increased funding channelled through the 2007-2013 National Research, Development and Innovation Plan is expected to stimulate the number of R&D projects and partnerships undertaken within the S&T Parks.

Beginning with 2008, in Romania is published by National Authority of Scientific Research *Innobarometer. Innovation in the development regions*. Analyzing the data from Innobarometer 2008 report, we can see another characteristic of innovation in Romania: gaps between the regions of development, the most innovative region being Bucharest – Ilfov (see table 1).

Table 1

Level of innovation of the regions of development

Rank	***Region of development***	***Score***
1	Bucharest – Ilfov	72.49
2	South – East	31.73
3	North– West	29.56
4	North – East	29.44
5	Center	28.04
6	West	26.05
7	South – West	21.35

Source: *Innobarometer. Innovation in the development regions*, 2008

4. *Romania: the main innovation challenges in the crisis context. Statistic analyses regarding Research and Development before the crisis*

In Romania the economic crisis of 2008 had effects on the innovation potential, too. The crisis brought significant cuts in the 2009 gross expenditure on research and development (GERD), with consequences difficult to quantify yet. Instead of continuing the progression (0.41% in 2005, 0.46% in 2006, 0.5% in 2007, 0.7% in 2008, 0.89% in 2009, 1% in 2010) according the government commitment to meeting Lisbon Strategy objectives, because of the crisis in January 2009 the government allocated only 0.18% of the GDP to research, development and innovation activities. Though, because of the protests from the scientific community, in February 2009, GERD was supplemented with approximately EUR 148 million, reaching 0.27% of the GDP, but still remaining significantly lower than the 2008 GERD level and the foreseen level for 2009. The drastic cuts in public funding of research, development and innovation have been reflected in the main financial instruments coordinated by the National Authority for Scientific Research, such as the programmes of the 2007-2013 National RDI Plan NP II (for example Programme 5 Innovation – coordinated by Managerial Agency of Scientific Research and Technological Transfer) and the grants (Ideas, Human Resources etc.) of the National Council of Scientific Research from Higher Education, blocking 2009 competitions and even unrolling projects. The consequences of the cuts are complex and annihilate the encouraging signs of a

slight recovery for Romanian RDI after a few years of improved funding, especially in regards to the attraction of human resources for RDI and enhancing the public-private partnerships, which are some of the key weaknesses of the system (Giurgeanu, 2009).

Let's analyze in detail the situation before the crisis, with focus on the enterprise sector, the subject of our paper.

Table 2

Weight of total research-development expenditure by execution sector and funding source in the GDP

– percentage –

	2003	2004	2005	2006	2007	2008
Weight of total research-development expenditure by execution sector, in the GDP – %-	**0,39**	**0,39**	**0,41**	**0,46**	**0,52**	**0,59**
Enterprises sector – % in the GDP	0,22	0,21	0,20	0,22	0,22	0,18
Government sector – % in the GDP	0,12	0,13	0,14	0,15	0,18	0,24
Higher education sector – % in the GDP	0,04	0,04	0,06	0,08	0,13	0,17
Weight of total research-development expenditure by funding source, in the GDP – % -	**0,39**	**0,39**	**0,41**	**0,46**	**0,52**	**0,59**
Enterprises – % in the GDP	0,18	0,17	0,15	0,14	0,14	0,14
Public funds – % in the GDP	0,18	0,19	0,22	0,29	0,35	0,41
Higher education units – % in the GDP	0,01	0,01	0,02	0,01	0,01	0,02
Funds from abroad – % in the GDP	0,02	0,02	0,02	0,02	0,02	0,02

Source: *Research-development in Romania – Statistical data collection (2003-2008)*, p. 19.

The weight of total research-development expenditure in GDP in enterprises sector during the period 2003-2007 was constantly greater than the similar weight in government sector or higher education sector. Moreover, the differences between enterprises sector and higher education sector are relevant. Unlike previous years, in 2008 the weight of total research-development expenditure in GDP in government sector was higher than in enterprises sector. The weight of total research-development expenditure in government sector and higher education sector has increased each year (2003-2008), while in the enterprise sector had a cyclic evolution.

Regarding the weight of total research-development expenditure by financing source, in GDP, it is noted that public funds have the largest share, with a constant growth trend. The enterprises sector ranks second, followed far away by higher education units and abroad funds. Besides, the indicators for enterprises sector have a little tendency to decrease (according to table 2).

Table 3

Total expenditure from research-development activity, by execution sector and scientific field (In concordance with preponderant scientific field of R&D activity)

– lei million current prices -

	2003	2004	2005	2006	2007	2008
Enterprise sector	**443**	**527**	**589**	**759**	**907**	**893**
Scientific field						
Natural sciences	21	37	41	161	164	159
Engineering and technology	346	411	422	426	537	550
Medical sciences	14	14	37	34	52	59
Agricultural sciences	62	65	89	135	132	124
Social sciences	-	-	-	2	22	1
Humanities	-	-	-	1	-	-

Source: *Research-development in Romania – Statistical data collection (2003-2008)*, p. 21.

A main indicator of research-development activity within the enterprise sector refers to the total expenditure from research-development, by scientific field: natural sciences, engineering and technology, medical sciences, agricultural sciences, social sciences and humanities. The obvious feature seen from the Table n. 3 is that engineering and technology is the science field with the highest total expenditure from research-development activity. Beginning with 2006, natural sciences ranked second, followed by agricultural sciences and medical sciences. Total expenditure from research-development activity in humanities field is almost inexistent. The same observation is valid for social sciences, except year 2007, when total expenditure from research-development activity was higher (22 lei million current prices compared with 1 or 2 lei million current prices in 2008 and 2006).

Table 4

Current expenditure from research-development activity, by execution sector and type of research

– lei million current prices –

	2003	2004	2005	2006	2007	2008
Enterprises sector	**394**	**470**	**525**	**649**	**738**	**768**
Fundamental research	55	58	48	142	179	203
Applicative research	251	284	384	408	465	446
Experimental development	88	128	93	99	94	119

Source: *Research-development in Romania – Statistical data collection (2003-2008)*, p. 23.

Another indicator for the research-development activity of enterprises sector refers to current expenditure from research-development activity by type of research: fundamental research, applicative research and experimental development (table n. 4). In this regard, over the period under review, applicative research ranks first. Regarding fundamental research and experimental development, it is noted a different evolution in 2003-2005 and 2006-2008. While in 2003-2005, current expenditure from research-development activity for experimental development was higher than the similar indicator for fundamental research, in 2006-2008, the trend was reversed.

Based on the priorities defined in the key current policy documents and the EIS 2008 indicators, *INNO – Policy TrendChart, Innovation Policy Progress Report, Romania 2009* identified the following main innovation challenges for our country:

1. Increase the innovative potential of enterprises, particularly the SMEs;
2. Improve technology transfer and business support infrastructure (business incubators, technology transfer offices, S&T parks and the like);
3. Improve partnerships among industry, university and R&D institutions.

The first challenge is argued by: Business R&D expenditure (relatively stable around 20% of EU-27 average over the last five years, 0% growth),Venture capital (3-year average) (slightly positive trend, 3.5% growth), SMEs innovating in-house (slightly positive trend, 2.6% growth), Innovative SMEs cooperating with others (slightly positive trend, 0.6% growth), Firm renewal (SMEs entries + exits) (oscillating trend, -0.1% growth), Public-private co-publications (2-year average) (positive trend, 6.4% growth), Product/process innovators (SMEs) (slightly positive trend, 2.1% growth), Employment in medium-high/high-tech manufacturing (slightly positive trend, 1.6% growth), Knowledge-intensive services exports (slightly positive trend, 2.3% growth), New-to-market sales (negative trend, -9.2% growth). Following indicators and trends argue the second challenge: SMEs innovating in-house (slightly positive trend, 2.6% growth); Innovative SMEs cooperating with others (slightly positive trend, 0.6% growth); Firm renewal (SMEs entries + exits) (oscillating trend, -0.1% growth), and Public-private co-publications (2-year average) (ascending trend, 6.4% growth) supports the third challenge.

5. *Multiple Regression Model*

Using SPSS (Statistical Package for the Social Sciences) and Le Sphinx softwares, we developed a regression analysis *in order to determine whether the turnover of enterprises* (dependent variable) *is related to* gross investments and *research and development expenses* (independent variables). In this way we wanted to demonstrate the importance of innovation (in terms of research and development) for enterprises competitiveness. We used for the model data from table 5 and table 6.

Table 5

Main economic and financial indicators of enterprises, by size class and by type of ownership (Enterprises with main activity industry, construction and market services)

– lei million current prices –

Size classes, by average number of employees	Year	Turnover	Gross investments
Total	2003	345743	42386
Total	2004	450843	62749
Total	2005	512614	73668
Total	2006	627535	87457
Total	2007	769905	145879

Source: *Romanian Statistical Yearbook 2005-2008*

Table 6

Total expenditure from research-development, by execution sector and type of ownership

– lei million current prices –

	2003	2004	2005	2006	2007
Total	762	953	1184	1566	2177
Of which: current expenditure	673	861	1040	1319	1742
Enterprise sector	*443*	*527*	*589*	*759*	*907*

Source: *Research-development in Romania – Statistical data collection (2003-2008),* p. 17.

Analyzing total turnover achieved in 2003-2007 by the Romanian enterprises, it can be generally described as an annual average turnover of 541328 mil.RON for the considered period of time, which is approximately 147953.14 mil. EUR. The conversion was realized considering the average of exchange rate for EUR/RON (1 EUR = 3.65878 RON, according to the Romanian National Bank data).

In the same period, the gross investments were at the average level of 82427 mil RON/year which means 22528.54 mil. EUR (calculated using the same average exchange rate), and the mean of R&D expenses was 645 mil.RON (176.28 mil.EUR) (See table 7)

Table 7

Descriptive Statistics

	Mean	Std. Deviation	N
TURNOVER	541328,0	163511,93613	5
GROSSINV	82427,80	39111,00436	5
RDEXPENS	645,0000	186,75117	5

In our analyses we assumed that the turnover is generated in its significant part by the gross investments and also by the research and development expenses. We examined the relationship between these three variables, and, the hypothesis is confirmed, a significant correlation is established between turnover and gross investments, and between turnover and R&D expenses, as you can see in the table 8,

were the value of the correlation coefficient is very close to 1, which means that the considerate correlations are strong.

Table 8

Correlations

		TURNOVER	GROSSINV	RDEXPENS
Pearson Correlation	TURNOVER	1,000	,970	,995
	GROSSINV	,970	1,000	,962
	RDEXPENS	,995	,962	1,000
Sig. (1-tailed)	TURNOVER	,	,003	,000
	GROSSINV	,003	,	,004
	RDEXPENS	,000	,004	,
N	TURNOVER	5	5	5
	GROSSINV	5	5	5
	RDEXPENS	5	5	5

Regression equation:

Turnover = +313.183 x R&D Expenses + 2.622 x Gross Investments + 114770.079

Our multiple regression model demonstrated that the turnover increase can be predicted using two significant predictora such as gross investments and R&D expenses. The Model Summary table revealed us the following:

- The R – coefficient (multiple correlation coefficient) value is 0.996 and if we compare it with the maximum value 1, we can conclude there is a highly strong correlation, approximately 99% of the turnover variation can be predict by the two variables (Gross investments and R&D expenses);
- The R square has the value 0.992 and
- The Adjusted R-square takes into consideration the number of observations, generally is smaller than R and R square, but is still highly enough to explain the relationship between variables.

Table 9

Model Summmary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	,996[a]	,992	,984	954,61263	,992	120,778	2	2	,008	1,528

a. Predictors: (Constant), RDEXPENS, GROSSINV

b. Dependent Variable: TURNOVER

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,996[a]	,992	,984	20954,61263

a. Predictors: (Constant), RDEXPENS, GROSSINV

b. Dependent Variable: TURNOVER

The regression model has an acceptable limit of standard error: 20954 mil RON, meaning 3,8% of the average turnover (less than 5%).

Table 10

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	365844,7	777133,0	541328,0	162839,20093	5
Std. Predicted Value	-1,078	1,448	,000	1,000	5
Standard Error of Predicted Value	10186,34	20887,33	15652,92	4801,49958	5
Adjusted Predicted Value	385422,5	891352,8	575964,0	208040,56199	5
Residual	-20101,7	18268,39	,0000	14817,14868	5
Std. Residual	-,959	,872	,000	,707	5
Stud. Residual	-1,414	,998	-,281	1,090	5
Deleted Residual	-121448	23921,13	-34636,0	58328,16318	5
Stud. Deleted Residual	-49,072	,995	-10,188	21,796	5
Mahal. Distance	,145	3,174	1,600	1,391	5
Cook's Distance	,051	10,531	2,634	4,477	5
Centered Leverage Value	,036	,794	,400	,348	5

a. Dependent Variable: TURNOVER

Table 11

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,06E+11	2	5,303E+10	120,778	,008[a]
	Residual	8,78E+08	2	439095790,3		
	Total	1,07E+11	4			

a. Predictors: (Constant), RDEXPENS, GROSSINV

b. Dependent Variable: TURNOVER

Applying ANOVA analysis (see table 5), we can conclude that the model fits very well (Sig has the value of 0.008, less than 5%).

Table 12

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13337,456	59615,324		,224	,844
	GROSSINV	,712	,978	,170	,728	,542
	RDEXPENS	727,614	204,813	,831	3,553	,071

a. Dependent Variable: TURNOVER

Table 13

Coefficient Correlations[a]

Model			RDEXPENS	GROSSINV
1	Correlations	RDEXPENS	1,000	-,962
		GROSSINV	-,962	1,000
	Covariances	RDEXPENS	41948,382	-192,638
		GROSSINV	-192,638	,956

a. Dependent Variable: TURNOVER

Table 14

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	GROSSINV	RDEXPENS
1	1	2,916	1,000	,00	,00	,00
	2	8,073E-02	6,010	,17	,06	,00
	3	3,057E-03	30,886	,82	,94	1,00

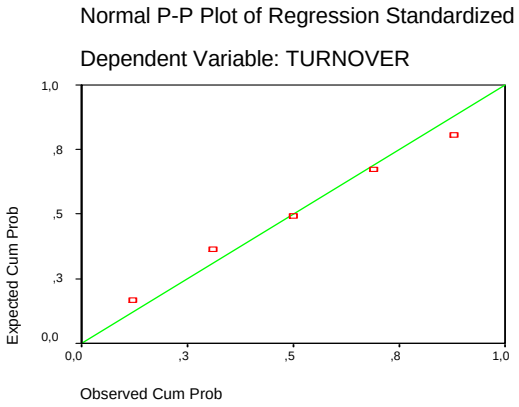
a. Dependent Variable: TURNOVER

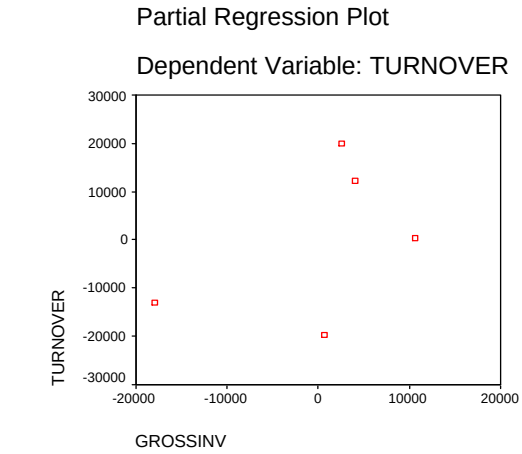
Table 15

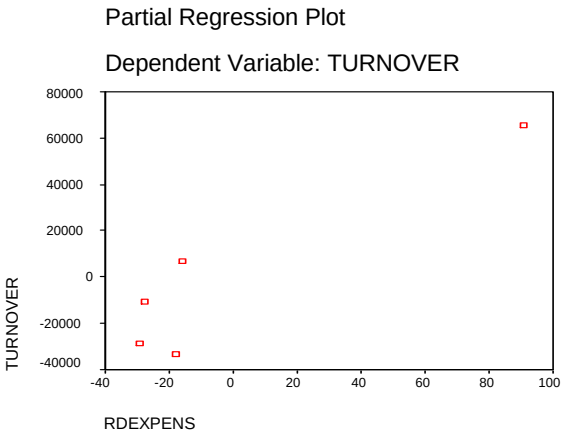
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	365844,7	777133,0	541328,0	162839,20093	5
Residual	-20101,7	18268,39	,0000	14817,14868	5
Std. Predicted Value	-1,078	1,448	,000	1,000	5
Std. Residual	-,959	,872	,000	,707	5

a. Dependent Variable: TURNOVER







Conclusions

It is very important for Romania to find the right measures which will allow the innovation capacity to be increased. Research and development are key elements for innovation, but they are not the only ones: we can speak also about organizational and the marketing issues and about the fundamental role of human resources. Innovation must be understood as a multi-faceted phenomenon, denoting both a process and its results. Innovation is very strong connected with competitiveness in terms of economic processes, products (or services), opening up new markets, business start-ups or work organization, having a major role for social and economic progress of Romania, and also for the success of the European knowledge-based society.

Unfortunately, the effects of financial crisis have occurred over the internationalization of innovation (trends in foreign direct investments, trade, geographic focus, scope of activities). Another consequence of the credit shortage

is that the financing of innovation and related educational and R&D activities has become more difficult. Generally, the effects of the crisis on innovation have been felt by individuals, businesses and communities across Europe since 2008. It is important for Romania to demonstrate the capacity to deal with the crisis, in order to prevent a reduction in innovation activities or to initiate innovation-boosting measures. Romania has to act in a proactive manner.

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